



National Student Team Contest (first stage)

Solution of task 2. Plasmon resonance

1. Almost all, even small ions with detection limit up to 10 pg/mL. Binding kinetics, affinity (Kd) and thermodynamics can be obtained.
2. Limitations: (1) molecules may change their conformation upon binding to metal films; (2) molecules can be not in an optimal orientation to interact with their ligands; (3) nonspecific binding often occurs; (4) differences in concentration of molecules near the surface and in the solution.
3. Microscale thermophoresis, binding to radioactive ligands, backscattering interferometry and etc.
4. There are several protocols of “molecular fishing”. The simplest protocol is to immobilize molecule of interest onto chromatography column (1); mix with lysate (2); filtrate (3); perform LC-MS/MS analysis (4); analyze each potential ligand with SPR (5). There are several hints to increase the efficiency of the method, including the use of magnetic nanoparticles functionalized with molecules of interest. It is necessary to validate affinity with SPR to avoid ligands which bind nonspecifically to the target.
5. All reasonable examples are acceptable. For example, using this protocol proteins interacting with beta-amyloids can be found to help in Alzheimer treatment; or proteins interacting with and inhibiting Bcr-Abl to cure myeloid leucosis.